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RESPONSES TO OHIO EPA COMMENTS ON THE GLACIAL OVERBURDEN/UPPER GREAT MIAMI AQUIFER MODELING IMPROVEMENT TECHNICAL APPROACH WORK PLAN, REVISION 3

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Department of Energy
Fernald Environmental Management Project
P.O. Box 398705
Cincinnati, Ohio 45239-8705
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JAN 13 1994
DOE-0694-94

Mr. James A. Saric, Remedial Project Director
U.S. Environmental Protection Agency
Region V - 5HRE-8J
77 W. Jackson Boulevard
Chicago, Illinois 60604-3590

Mr. Graham E. Mitchell, Project Manager
Ohio Environmental Protection Agency
40 South Main Street
Dayton, Ohio 45402-2086

Dear Mr. Saric and Mr. Mitchell:

RESPONSES TO OHIO ENVIRONMENTAL PROTECTION AGENCY COMMENTS ON THE GLACIAL OVERBURDEN/UPPER GREAT MIAMI AQUIFER MODELING IMPROVEMENT TECHNICAL APPROACH WORK PLAN, REVISION 3

Enclosed for your review are responses to Ohio Environmental Protection Agency (OEPA) comments on the Glacial Overburden/Upper Great Miami Aquifer Modeling Improvement Technical Approach Work Plan, Revision 3.

If you or your staff have any questions, please contact Kathleen Nickel at (513) 648-3166.

Sincerely,

Jack R. Craig
Fernald Remedial Action
Project Manager

FN:Nickel

Enclosure: As Stated

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Recycled and Recyclable

cc w/enc:

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R. L. Glenn, Parsons
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Response to Ohio EPA Comments
Glacial Overburden/Upper Great Miami Aquifer
Modeling Improvement Technical Approach/Work Plan
Revision 3, September 1993

Commenting Organization: Ohio EPA
Section #: 2.3.3
Original Comment # 1

Commentor: M. Proffitt
Pg. #: 2-13 Line #: 17 Code:

Comment: How will the significance of the storm sewer drainage/recharge be evaluated?

Response: A map of average perched groundwater elevations, made for the modeling effort, shows a significant reduction in perched water elevations in the area of the main plant storm sewer drain running from north to south through the middle of the process area to the storm water retention basins. The effect of the storm sewer drain will be modeled by including discharge/sink blocks in the glacial overburden model layer corresponding to the elevation of the drain. The model will be calibrated to the average perched groundwater elevations.

Action: The final discharge/sink blocks, their location in the model and their discharge rates will be described in the glacial overburden modeling report to be released when the modeling effort is completed.

Commenting Organization: Ohio EPA
Section #: 2.3.3
Original Comment # 2

Commentor: M. Proffitt
Pg. #: 2-13 Line #: 30 Code:

Comment: How will the change in conductivity for liners and clay be quantified? It is Ohio EPA's understanding that detailed documentation of liner installation for most of the waste disposal locations at the site do not exist.

Response: Since fate and transport simulations for the RI modeling applications are run for long periods (up to 1000 years), the conservative approach was taken and any clay liners existing under waste disposal areas were not included in the model.

Action: The final glacial overburden modeling report will document the modeling assumptions made for waste disposal areas.

Commenting Organization: Ohio EPA
Section #: 2.7
Original Comment # 3

Commentor: M. Proffitt
Pg. #: 2-18 Line #: 14 Code:

Comment: The potential pathway of direct connection between the waste source and the Great Miami Aquifer should be added as item number 4.

Response: The DOE agrees with the comment.

Action: The direct connection pathway will be added to the list of potential pathways from near-surface waste sources to the Great Miami Aquifer in the final glacial overburden modeling report to be released when the modeling is completed.

Commenting Organization: Ohio EPA
Section #: 2.7.1
Original Comment # 4

Commentor: M. Proffitt
Pg. #: 2-20 Line #: 25-28 Code:

Comment: A technical discussion which more thoroughly describes the methodology of how an equivalent porous media will be substituted for fractured glacial overburden should be included in this report. Specifically, what data will be used to quantify the fractures, how will the nature of the representative porous media be determined, and how will a hydraulic conductivity be assigned to the porous media. Additionally, the discussion should also include a description of how the distribution of the porous media will be applied; specifically, how will varying thicknesses and occurrence of fractures be represented by the model.

Response: Hydraulic conductivity determinations from laboratory permeameter tests (laboratory scale), slug tests (local scale), and pump tests (area scale) will be used to indirectly model the effect of fractures. Model layer thicknesses will be taken from cross sections created from glacial overburden drilling data. Near-surface fractures will be taken into account in the flow model by increasing the vertical hydraulic conductivity of the first model layer over the measured bulk hydraulic conductivity by a factor of 10. Contaminant loadings or initial contaminant plumes will be placed below the first model layer, assuming instantaneous vertical transport through the first layer. Typically the vertical hydraulic conductivity in a model is taken to be smaller than the horizontal hydraulic conductivity. For example, the grey clay bulk hydraulic conductivity was determined to be 3.62×10^{-6} cm/sec (.01025 ft/day) but the vertical conductivity used for modeling was 7.23×10^{-7} (.00205 ft/day), one fifth the horizontal value. The average hydraulic conductivity calculated for brown clay from the slug tests was 3.59×10^{-5} cm/sec (0.100 ft/day). In order to account for the fractures, the value assigned in the model for vertical hydraulic conductivity of brown clay was 3.59×10^{-4} cm/sec (1.0 ft/day) or a value 10 times higher than the horizontal hydraulic conductivity. This approach should be as accurate as attempting to model the fractures directly, given the general lack of success by the groundwater modeling community at modeling fractures in glacial overburden sediments.

Action: The assumptions for vertical and horizontal hydraulic conductivities will be documented in the final glacial overburden modeling report to be released when the modeling is completed.

Commenting Organization: Ohio EPA
Section #: 3.2
Original Comment # 5

Commentor: M. Proffitt
Pg. #: 3-3 Line #: 23-31 Code:

Comment: Has this methodology of unsaturated flow simulation been approved by the technical support for the SWIFT III code?

Response: The equivalent porous medium being used to model the glacial overburden is assumed to be completely saturated below the perched water table, which is more conservative than assuming a partially saturated medium. Therefore, SWIFT (which is a code for saturated conditions) is a valid code to use for the modeling effort under this assumption. The assumption of saturation is also being tested for validity and to quantify its effect on the SWIFT modeling results by comparing the output to the results obtained with the auxiliary modeling code, MSTS, which is a saturated/unsaturated modeling code.

Action: The comparison of the SWIFT results with the MSTS results will be documented in the final glacial overburden modeling report to be released when the modeling is completed.

Commenting Organization: Ohio EPA
Section #: 4.2.2
Original Comment # 6

Commentor: M. Proffitt
Pg. #: 4-3 Line #: 18-19 Code:

Comment: The glacial till pump test locations were selected based upon the presence of large, continuous sand zones in order to maximize the potential of encountering sufficient yield necessary to conduct this type of aquifer testing. How will calibrating the model to this type of unit aid in the calibration of the low permeability units?

Response: The main objective of the modeling study was to evaluate the potential for lateral contaminant migration within the continuous sand zones of the glacial overburden. The pump test data can be used to confirm the hydraulic properties of the sand zones, their spatial extents, and interaction or degree of hydraulic connection between the sand and surrounding low permeability zones. Before using the pump test data, the conductivity values obtained from slug tests performed in both the sand and low permeability units, together with the perched water elevation data from the 1000-series monitoring wells, have been used to calibrate the steady-state flow portion of the glacial overburden model. As expected, calibration results show relatively low flow velocities in the low permeability zones. Preliminary contaminant transport simulations and measured time trends of contaminant concentrations further show that contamination does not have significant lateral migration potential in the low permeability zones. These calibration results are considered reasonable for the low permeability units.

Action: No action required.